SIPLINK medium-voltage direct-current transmission

The optimal way to connect distribution networks

Answers for energy.
Thanks to innovative power electronics, energy can now be efficiently exchanged on the medium-voltage distribution level too – using a medium-voltage direct-current transmission system called SIPLINK (Siemens Multifunctional Power Link).

The system allows the coupling of power distribution networks (despite their different operating parameters), cuts costs by optimizing energy import, controls load flow during power transmission and optimizes voltage control by supplying reactive power. In addition, SIPLINK improves the quality of power supplies in terms of reliability and voltage quality at the distribution level. It also offers economical alternatives when networks need to be expanded, especially in densely populated areas – either by coupling distribution networks together or in stand-alone operation.

Innovative back-to-back technique controls power transfer and optimizes networks

DC transmission systems can be used to link together a number of different power producers – and also networks of different ratings and frequencies – without any adverse effects on network stability or any increases in fault current. SIPLINK from Siemens can connect two or more separate medium-voltage grids with different voltages, frequencies or phase angles. With SIPLINK, there is no need to purchase expensive “top-up” energy, nor to switch in diesel generating sets. This latter advantage also eases the situation in terms of CO2 emissions.

One technology – two uses

With SIPLINK, Siemens is offering power utilities and industrial customers a technology based on self-commutated IGBT pulse-controlled converters, aimed at boosting the efficiency of new and existing networks. There are two main fields for SIPLINK: The first is the coupling together of distribution networks in which existing generators feed into a 3-phase AC system. The second is infeed into a stand-alone system which has no voltage source of its own. In this case, it is SIPLINK that generates the network parameters.

Easy to use – easy to monitor

The system incorporates a supervisory level for operator control and monitoring. An interactive PC operator interface allows the status of the system to be visualized and archived; reference values (for active and reactive power) can also be entered. Another useful feature is telecontrol of the system via long-distance data transmission; in the event of any malfunction, faults can be identified by remote diagnosis.
SIPLINK offers convincing advantages for the connection of medium-voltage networks:

- Controlled exchange of power between two medium-voltage networks, i.e. for balancing peak loads
- Reduced costs of balancing power
- Reactive power compensation for both networks
- No increase in short-circuit power

References

SIPLINK: The Württemberg-Bavaria load equalizing system links Ulm and Neu-Ulm

The 2-MVA SIPLINK medium-voltage back-to-back connection was commissioned in 2003. Its task is to join up the respective distribution networks of the two German cities Ulm and Neu-Ulm, enabling a controlled exchange of power between the two systems.

SIPLINK for the Flender-Werft shipyard in Lübeck

In the German shipyard Flender-Werft SIPLINK serves to supply electricity – taken from the yard’s own 50Hz network – to vessels under construction. While a ship is being built, its generators are not yet on-line so SIPLINK powers the whole on-board system itself. SIPLINK is also used when the on-board generators are being tested. Here, SIPLINK simulates the resistance of the water as required by the appropriate classification societies. The electricity used for this purpose is fed back into the yard’s network and so helps cut costs. The end result is a controlled exchange of active power in both directions, which optimizes stability and load flow for both the yard’s network and the on-board systems.

SIPLINK in the Federal German Government’s EDISON Project

The SIPLINK installation comprises two 1,200-kVA converters in multiparallel connection. The DC back-to-back link replaces an isolating section in the Stadtwerke Karlsruhe network; it allows a controlled exchange of power between two subnetworks. This prevents overloading of the cable leading from the transformer substation. In order to optimize the voltage level, the system also provides reactive power at the two feeder points.

30-MVA 50/60Hz SIPLINK in Saudi Arabia

The 30-MVA SIPLINK is the reliable connection between a 50Hz and 60Hz network in Saudi Arabia allowing a controlled exchange of energy between the two systems. With the operation of SIPLINK the client connected the stand-alone network to the network of keeping own generation as back-up available and avoided a complete modification of the 50Hz network.